

## CLAIMS

I claim:

1. A financial instrument based upon the volatility in the actual returns of an underlying, comprising:

- (a) a creation date;
- (b) a term expiring at an expiration date; and
- (c) a settlement price at said expiration date based upon realized volatility,

defined as " $S_{vol}$ ", and determined in accordance with the following formula:

$$S_{vol} \equiv f \left\{ R_{t_1}, R_{t_2}, R_{t_3}, \dots, R_{t_n} \right\}$$

wherein:

$$S_{vol} \geq 0$$

$$n > 1$$

and

$t$  = each of a series of observation points from 1 to "n";

$R_t$  = return of the underlying based upon each of the observation points in time " $t_n$ ";

and

$n$  = total number of observations within the term.

2. The financial instrument of claim 1, wherein:

$$n \geq 20$$

3. The financial instrument of claim 1, wherein the term is selected from the group consisting of days, months, quarters and years.

4. The financial instrument of claim 3, wherein the settlement price is annualized based upon an approximate total number of periods in a calendar year.

5. The financial instrument of claim 4, wherein the observation points are taken daily, and approximate total number of periods is selected from the group consisting of 245 to 262, and preferably 252.

6. The financial instrument of claim 1, wherein  $R_t$  is selected from the group consisting of:

$$R_t = \ln\left(\frac{M_t}{M_{t-1}}\right) \quad R_t = \left(\frac{M_t - M_{t-1}}{M_{t-1}}\right)$$

wherein:

$M_t$  = mark-to-market price at time "t"; and

$M_{t-1}$  = mark-to-market price at the time immediately prior to time "t", at time "t-1".

7. The financial instrument of claim 1, wherein the settlement price is determined in accordance with the following formula:

$$S_{vol} = \sqrt{\frac{P}{n} \sum_{t=1}^n R_t^2}$$

wherein:

P = approximate number of trading periods in a calendar year, and each observation point "t" is taken at the same time in each trading period.

8. The financial instrument of claim 7, wherein  $R_t$  is selected from the group consisting of:

$$R_t = \ln\left(\frac{M_t}{M_{t-1}}\right) \quad R_t = \left(\frac{M_t - M_{t-1}}{M_{t-1}}\right)$$

wherein:

$M_t$  = mark-to-market price at time "t"; and

$M_{t-1}$  = mark-to-market price at the time immediately prior to time "t", at time "t-1".

9. The financial instrument of claim 1, wherein the settlement price is determined in accordance with the following formula:

$$S_{vol} = \sqrt{\frac{P}{n-1} \sum_{t=1}^n (R_t - \bar{R})^2}$$

wherein:

P = approximate number of trading periods in a calendar year, and each observation point "t" is taken at the same time in each trading period; and

$\bar{R}$  = mean of all  $R_t$ 's.

10. The financial instrument of claim 7, wherein  $R_t$  is selected from the group consisting of:

$$R_t = \ln\left(\frac{M_t}{M_{t-1}}\right) \quad R_t = \left(\frac{M_t - M_{t-1}}{M_{t-1}}\right)$$

wherein:

$M_t$  = mark-to-market price at time "t"; and

$M_{t-1}$  = mark-to-market price at the time immediately prior to time "t", at time "t-1".

11. The financial instrument of claim 1, wherein each observation point "t" is taken at a predetermined time within each trading period in the year.

12. The financial instrument of claim 1, where in the settlement price  $S_{vol}$  is determined in accordance with the following formula:

$$S_{vol} = \sqrt{\frac{P_{hl}}{n} \sum_{t=1}^n (\ln \frac{h_t}{l_t})^2}$$

wherein:

$P_{hl}$  = total number of trading periods in a year wherein two observations points " $h_t$ " and " $l_t$ " are used, and " $h_t$ " is the high price point and " $l_t$ " the low price point for each such trading period in that year; and

$R_t$  =  $f\{h_t, l_t\}$ .

13. The financial instrument of claim 1, wherein the settlement price  $S_{vol}$  is determined in accordance with the following formula:

$$S_{vol} = \sqrt{\frac{P_{ohlc}}{n} \sum_{t=1}^n [\frac{1}{2}(\ln \frac{h_t}{l_t})^2 - (2 \ln(2) - 1)(\ln \frac{c_t}{o_t})^2]}$$

wherein:

$P_{ohlc}$  = total number of trading periods, wherein four observations points "h<sub>t</sub>", "l<sub>t</sub>", "c<sub>t</sub>" and "o<sub>t</sub>" are used, and "h<sub>t</sub>" is the high price point, "l<sub>t</sub>" the low price point, "c<sub>t</sub>" is the closing, last or daily settlement price, and "o<sub>t</sub>" the opening price for each such trading period; and

R<sub>t</sub> = f {h<sub>t</sub>, l<sub>t</sub>, c<sub>t</sub>, o<sub>t</sub>}.

14. An exchange for the trading of contracts based upon the volatility of an underlying, comprising the performance of the following steps:

(a) creating at least one volatility contract for a predetermined term, with a predetermined formula for settlement price based on a realized volatility formula; and  
(b) trading the at least one volatility contract at market-determined prices from creation through the date of expiration.

15. The exchange of claim 14, wherein the realized volatility formula is:

$$S_{vol} = \sqrt{\frac{P}{n} \sum_{t=1}^n R_t^2}$$

wherein:

P = approximate number of trading periods in a calendar year, and each observation point "t" is taken at the same time in each trading period; and

n = total number of observations within the term; and

R<sub>t</sub> = return of the underlying based upon each of the observation points in time "t<sub>n</sub>".

16. A method for the creation and trading of financial instruments based upon the volatility of an underlying, comprising the following steps:

- (a) creating at least one volatility contract for a predetermined term, with a predetermined formula for settlement price based on a realized volatility formula; and
- (b) trading the at least one volatility contract at market-determined prices from creation through the date of expiration.

17. The method of claim 16, wherein the realized volatility formula is:

$$S_{vol} = \sqrt{\frac{P}{n} \sum_{t=1}^n R_t^2}$$

wherein:

P = approximate number of trading periods in a calendar year, and each observation point "t" is taken at the same time in each trading period; and

n = total number of observations within the term; and

R<sub>t</sub> = return of the underlying based upon each of the observation points in time "t<sub>n</sub>".

18. A system for the creation, trading, and settlement of financial instruments based upon realized volatility, comprising:

- (a) creating a volatility contract, by:
  - (1) predetermining a realized volatility period;
  - (2) predetermining a time during a trading period that observations are taken;
  - (3) predetermining an annualization factor; and
  - (4) predetermining a formula for the calculation of realized volatility;
- and
- (b) listing said volatility contract on an exchange;
- (c) trading said volatility contract on said exchange during an anticipatory period and a realized volatility period;
- (d) settling the volatility contract at expiration in accordance with the predetermined formula.

19. The system of claim 18, wherein the settlement price of the volatility contract is determined in accordance with the following formula:

$$S_{vol} = \sqrt{\frac{P}{n} \sum_{t=1}^n R_t^2}$$

wherein:

- P = approximate number of trading periods in a calendar year, and each observation point "t" is taken at the same time in each trading period in that year; and
- n = total number of observations within the term; and

$R_t$  = return of the underlying based upon each of the observation points in time " $t_n$ ".